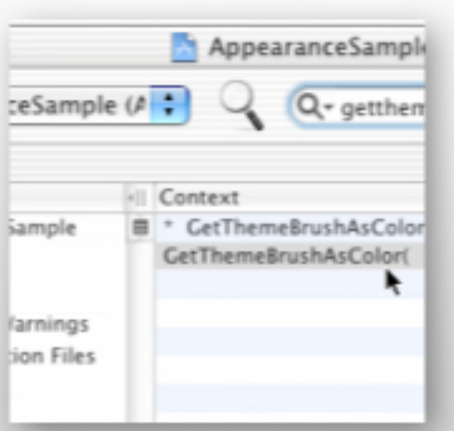
Increasing Productivity with Apple Tools

Session 303



Increasing Productivity with Apple Tools

Anders Bertelrud
Xcode Lead Engineer

What We'll Cover

- Moving to Xcode
- Optimizing build performance
- Building for multiple OS releases
- Workflow and automation
  - Source code management
  - Accessing documentation
  - Scripting and automation

The Common Theme

Moving to Xcode

Moving to Xcode

- It's easy to get started
- Many migration paths
  - Create project, add sources
  - Open Project Builder project
  - Import CodeWarrior project
  - Wrap Makefile in Xcode project
- Convert targets at your convenience
  - Native Xcode targets provide additional features

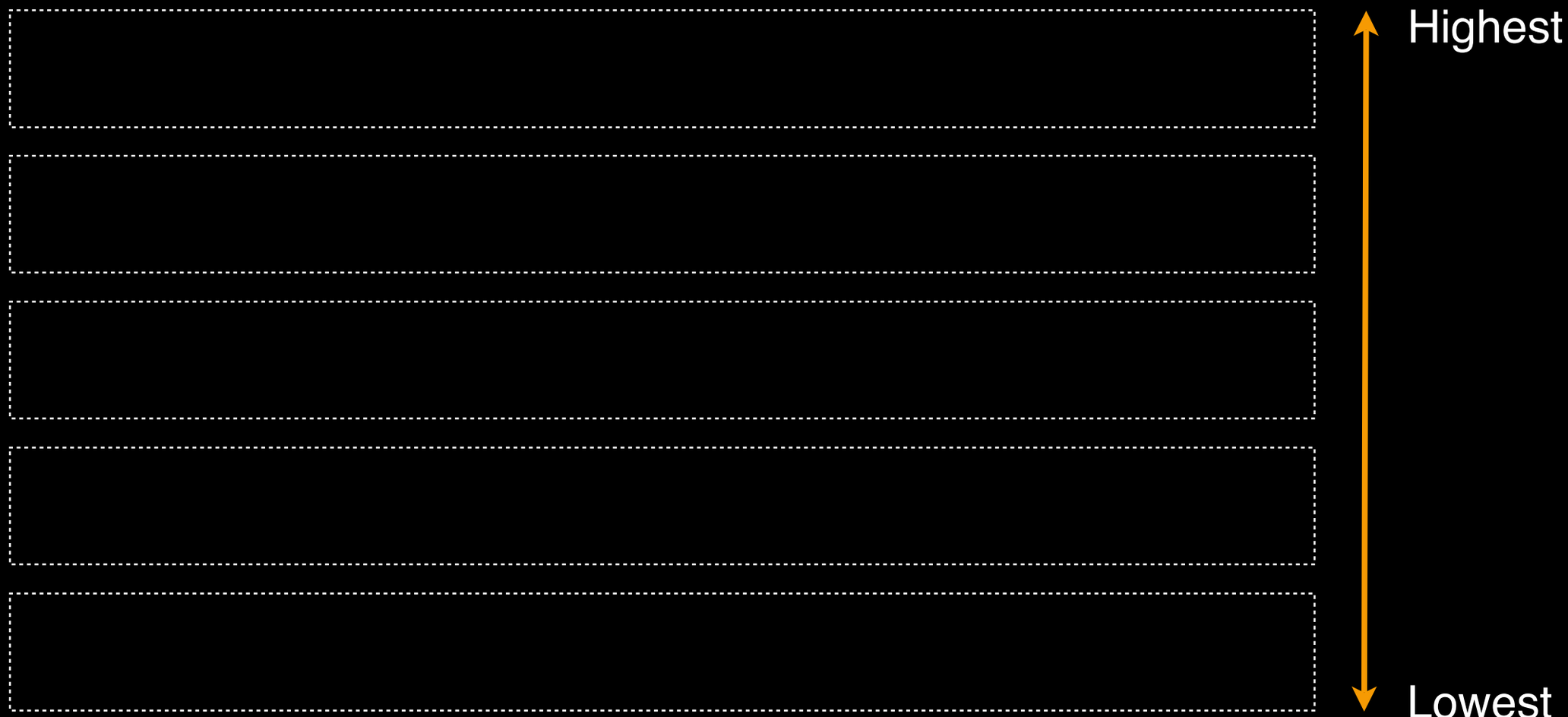
Target Types

- Native Xcode targets
  - Applications, Frameworks, Libraries, Plug-ins
- Project Builder targets
  - All product types supported by Project Builder
- External targets
  - Invoke any external build tool (e.g. Make or Ant)

Build Settings

- Build settings control the inner workings of a build
- Usually set on a particular target
- Can also set in a build style to provide variation
  - e.g., debug vs. release builds
- Settings in build styles override lower levels
- Passed as environment variables for tools

Precedence of Build Settings



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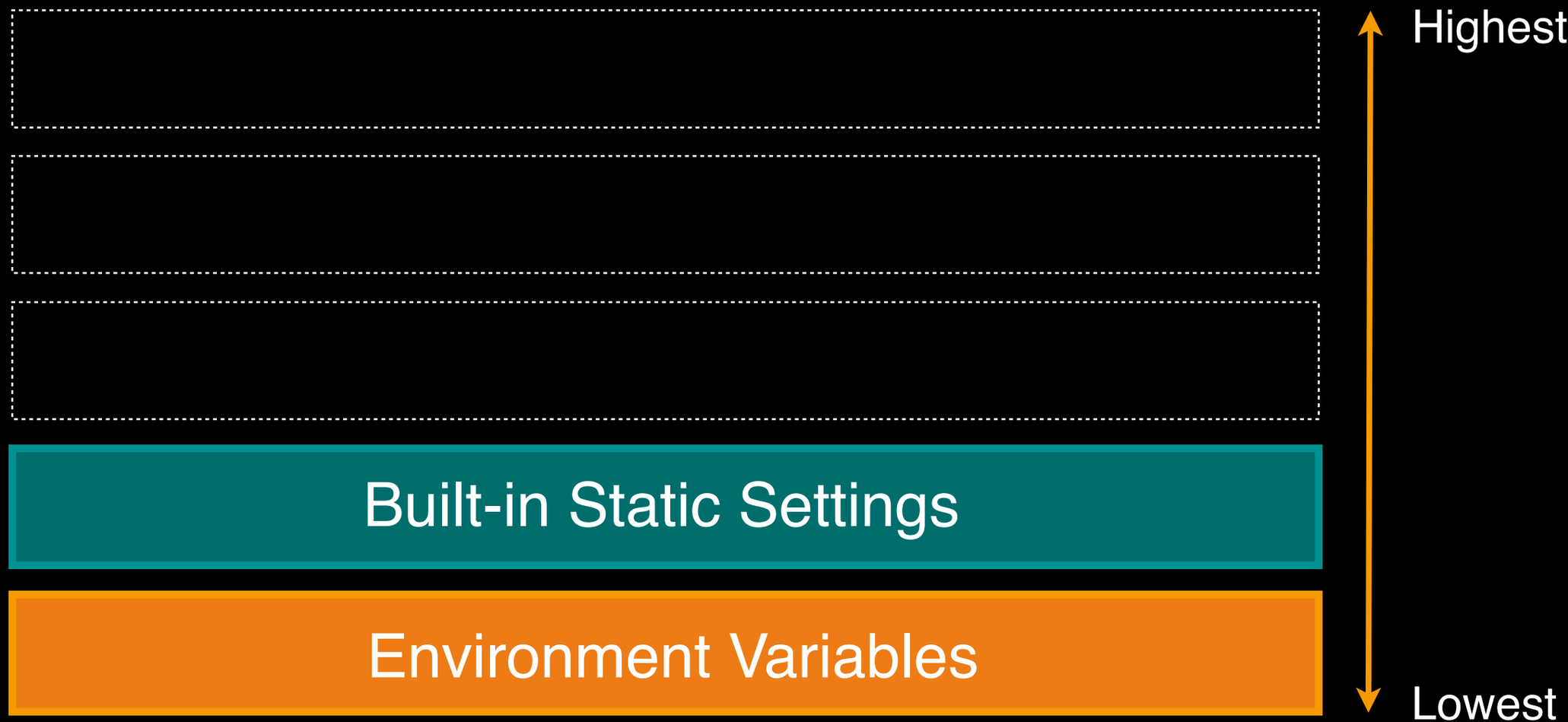

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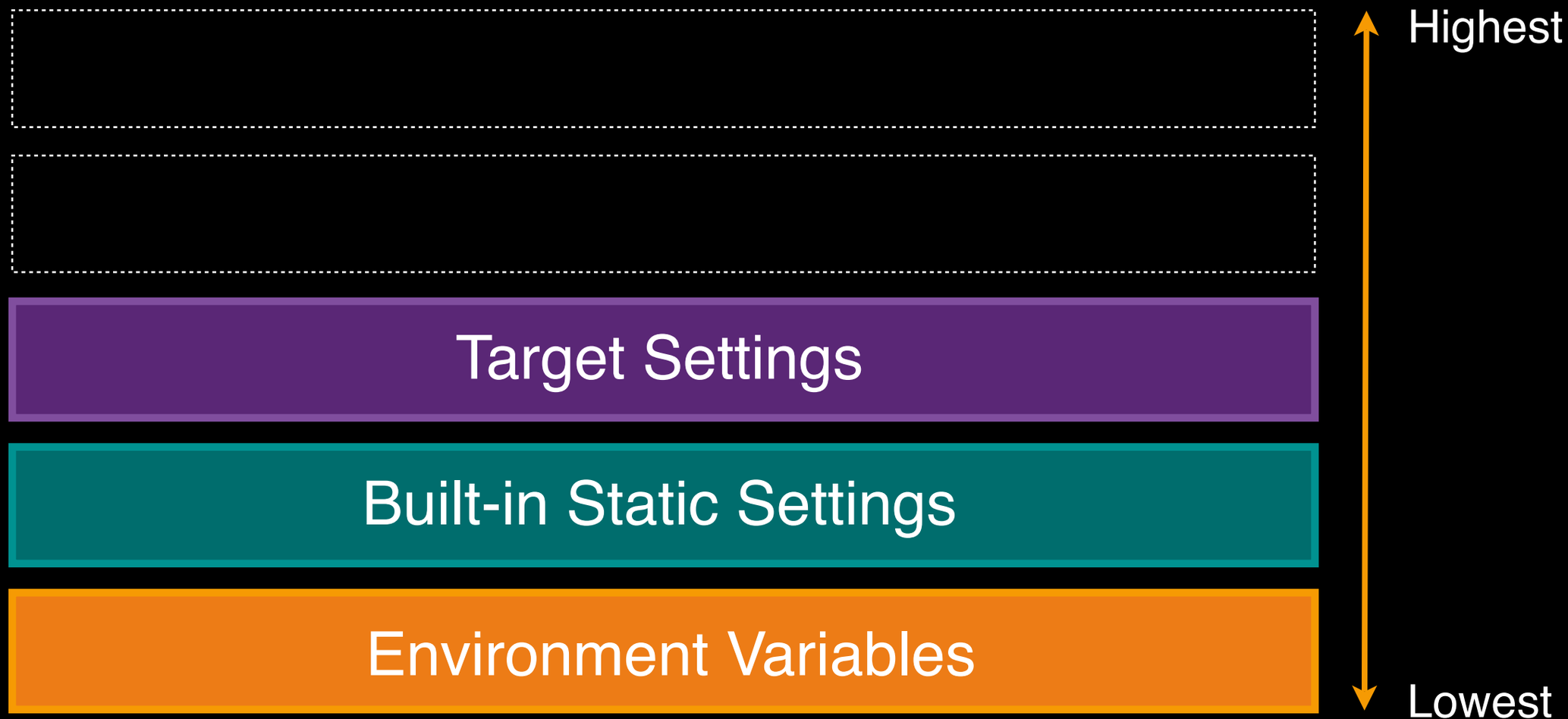

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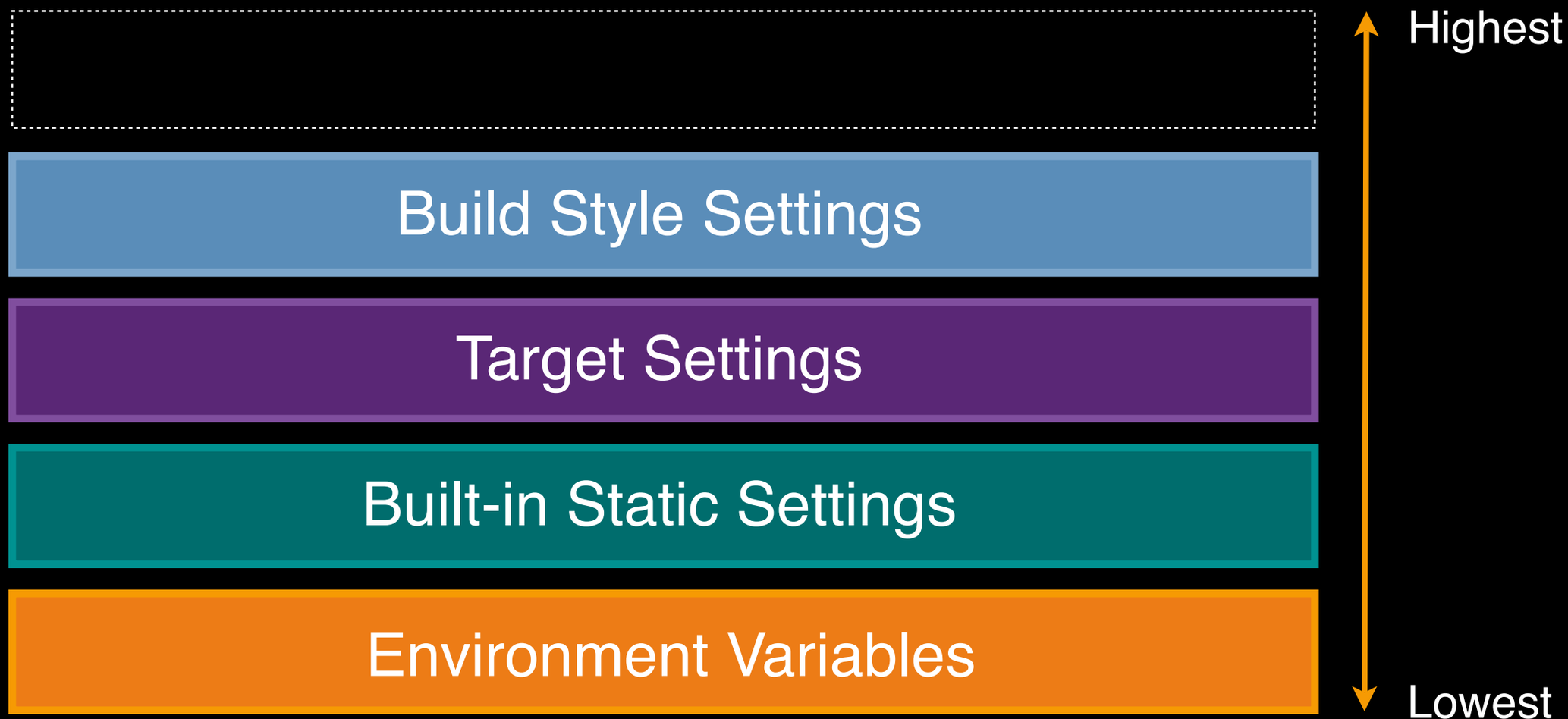

Precedence of Build Settings

Build Styles

- Dynamically override target settings
- Avoid having to duplicate targets

Build Styles

- Dynamically override target settings
- Avoid having to duplicate targets
- Examples:
  - Debugging symbols on or off
  - Zero Link enabled or disabled
  - Different optimization levels
  - Alternate algorithms
  - Features enabled or disabled

Build Rules

- Rules define how source files are processed
- First matching rule is the active one
- Each rule can match:
  - Category of file types (e.g., “C++ source files”)
  - Particular filename pattern (e.g., “*.[hc]”)
- Use rules to select compiler and version
  - e.g., GCC 3.1 vs 3.3, or Javac vs Jikes

Optimizing Build Performance

Optimizing Build Performance

- Fast, powerful build system
  - No dependency on external builds tools such as *Jam*
  - Tightly integrated with the user interface
- There are still opportunities for project-specific tuning
  - Precompiled headers (PCH)
  - Parallel and distributed builds
  - Zero Link
  - Fix and Continue

Precompiled Headers

- GCC 3.3 supports PCH (precompiled headers)
- Easy to set up using Xcode's target inspector
  - Create a prefix header to include common API
  - Enable the "precompile prefix header" setting
- Keep in mind:
  - Prefix header gets included for all source files in target
  - Only put infrequently changed headers in the PCH

Distributed Builds

- Xcode takes advantage of multiple processors
  - But why limit yourself to the ones in your own machine?
- Compiles can be distributed to other machines
- “Free love” vs. restricted mode
  - Can either use Rendezvous or specify a list of servers
- Requires GCC 3.3 and Xcode targets

Zero Link

- Link time is a significant part of turnaround time
- Typical editing affects few source files at a time
- Zero Link eliminates the link step by running directly from the object files
- Enabled for *Development* builds only, by default—*Deployment* builds generate full binaries

Fix and Continue

- Fix while debugging
- Enabled by default
- Great for localized changes
  - Logic errors, off-by-one errors, etc.
  - Edit within blocks

Demo

Scott Tooker
Xcode Engineer

Building for Multiple OS Releases

Building for Multiple OS Releases

- Run on one, develop for all
  - e.g., run Xcode on Jaguar, build for Panther Preview
- Each target can specify OS release to build against
- Xcode Developer Preview supports
  - 10.1.5
  - 10.2.6
  - Panther Preview

Multiple OS Release Support

- APIs for each OS release are packaged in an “SDK”
- What’s in an SDK?
  - Headers
  - Stub libraries
- SDKs can be added and removed independently
- Take advantage of OS features when available

Source Tree Support

- Access external source bases
  - PowerPlant, Qt, etc.
- Absolute or relative paths
- Used by CodeWarrior importer

Workflow and Automation

Source Code Management

- Tightly integrated into the IDE
- Built-in support for CVS and Perforce
- Support for day-to-day operations
  - Add, remove files
  - Update, check in changes
  - Compare revisions

Accessing Documentation

- Integrated documentation window
  - API lookup: searches as you type
  - Full-text: search all or part of the documentation
- What's available
  - Xcode help
  - Carbon, Cocoa, IOKit, etc., reference
  - Sun's Java documentation
  - Mac OS X man pages

Scripting and Automation

- Many ways to automate common tasks
  - Drive Xcode using AppleScript
  - Command line build tool
  - User Scripts menu
  - Worksheet functionality

AppleScript Support

- Access details of Xcode project model
  - Change target settings on multiple targets
  - Add files to targets
  - Start and stop builds

Building from the Command Line

- *pbbuild* provides access to IDE build system features
- Can write shell scripts for nightly builds, etc.
- There are switches for controlling:
  - Targets
  - Build styles
  - Overriding build settings

Script Menu

- Completely user-configurable
- Can contain any kind of script
  - AppleScript
  - Shell script
  - Perl, Python, etc.
- Command keys can be bound to scripts
- Scripts can modify contents of text buffers

Worksheet Functionality

- Xcode has MPW-style worksheet functionality
- Can select commands in text buffer and run them
  - Save frequently used code snippets in text files
  - Preserve history indefinitely
- Results are pasted back into the text buffer

Demo

Matt Morse
Tools Engineer, Documentation

Wrap Up

Anders Bertelrud

Summary

- Xcode has many productivity features
- Many work transparently
  - Zero Link, Fix and Continue, etc.
- Others need customization for best results
  - Precompiled headers, scriptability, etc.
- Xcode gives you the power and flexibility

How to Learn More

- Part of Xcode tools package
  - Use the Documentation window and search features
- Inside Mac OS X books
  “Inside Mac OS X: System Overview”
- Apple Developer Connection tools pages
  http://developer.apple.com/tools/
- CVS documentation
  http://www.cvshome.org/docs/
- Perforce documentation
  http://www.perforce.com/perforce/technical.html

Who to Contact

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xcode-feedback@group.apple.com

To Post Bug Reports
http://developer.apple.com/bugreporter

Mailing Lists at Apple
http://lists.apple.com

http://developer.apple.com/wwdc2003/urls.html

Roadmap

304 GCC In Depth Find out all about advancing a world-class compiler	**The Mission** **Wed., 3:30pm**
305 Tuning with Performance Tools Learn to use the tools and improve performance	**The Presidio** **Wed., 5:00pm**
306 AppleScript Studio Explore professional AppleScript development	**Pacific Heights** **Wed., 5:00pm**
307 Xcode for Carbon Development See how Carbon is supported by Xcode	**Russian Hill** **Thur., 9:00am**
FF009 Dev Tools Feedback Forum Give us your feedback	**North Beach** **Thur., 2:00pm**
308 Debugging Services for Mac OS X Hear the latest in debugging for Mac OS X	**The Presidio** **Thur., 3:30pm**

Q&A

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http://developer.apple.com/wwdc2003/urls.html

WWDC 2003

Worldwide Developers Conference